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**Fiscal Illusion and Cyclical Government Expenditure:  
State Government Expenditure in the USA**

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**Fiscal Illusion and Cyclical Government Expenditure:  
State Government Expenditure in the USA\***

**Abstract**

*A well-established literature argues that fiscal illusion increases the level of government expenditure. This paper focuses on the proposition that fiscal illusion also influences the cyclicity of government expenditure. Predictions are formed with reference to government reliance on high income-elasticities of indirect tax revenues and on intergovernmental transfers. Predictions are tested with reference to the expenditures of 36 states in the USA from 1980 to 2000. Government expenditures are more likely to be procyclical when citizens systematically under-estimate the cost of taxation.*

**Keywords:** Fiscal Illusion; Flypaper Effect; Procyclical Public Spending; Sub-Central Government Spending

**JEL classification:** E62; H50; H60; H70

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## 1. Introduction.

Procyclical public expenditure increases as national income increases and falls as national income decreases. Economists usually anticipate counter-cyclical expenditure (Alesina et al., 2008), but empirical studies increasingly report procyclical expenditure (Gavin et al., 1996; Talvi and Végh, 2005; Alesina et al., 2008; Woo, 2009; Abbott and Jones, 2013). Studies that explain procyclical expenditure highlight the relevance of political pressures for public expenditure. The likelihood of procyclical expenditure increases if there are ‘voracity effects’, i.e. if political pressures to raise public expenditure increase as national income increases and fall as national income falls (Lane and Tornell, 1996; Tornell and Lane, 1999). Empirical studies indicate that political pressure to increase public expenditure is a significant determinant of procyclical expenditure (Lane, 2003; Abbott and Jones, 2013).

This paper focuses on the way that the intensity of pressures to increase government expenditure changes over the economic cycle. The intensity of political pressure is gauged with reference to politicians’ willingness to increase expenditure to win votes (Downs, 1957). Pressure is intense when politicians believe they are able to increase expenditure without alarming voters that taxation will increase.

A well-established literature focuses on the circumstances in which voters are likely to under-estimate taxation systematically.<sup>1</sup> This literature has focused on the *level* of government expenditure. In this paper, the objective is to introduce and explore the proposition that fiscal illusion is also likely to increase the *cyclical*ity of government expenditure.

When focusing on the cyclicality of government expenditure, some of the sources of fiscal illusion are likely to be more relevant than others. In the next section of the paper, the intention is to review the many sources of fiscal illusion. Studies that have tested the reasons why voters underestimate taxation have focused on variables that capture the *extent* to which individuals are likely to underestimate taxation. For example, one of these variables is the complexity of the tax system. Studies test the significance of these sources of fiscal illusion separately. In the case of tax

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<sup>1</sup> Oates (1988), Dollery and Worthington (1996) and Dell’Anno and Mourão (2012) have surveyed this literature.

complexity, they test the proposition that adding a single variable (to measure tax complexity) to the socio-economic variables that are likely to influence the level of government spending, will reveal that tax complexity is a significant determinant of the level of taxation. In this paper, a first attempt (to our knowledge) will be made to assess the relative importance of all of these different *sources* of fiscal illusion on the level of government expenditure. The intention is to add this full complement of variables (variables that are said to be relevant when considering different sources of fiscal illusion) to the socio-economic variables that are likely to influence the level of government spending, in order to compare the impact that they exert on the level of government spending.<sup>2</sup>

In section three of the paper attention focuses on two sources of fiscal illusion that are likely to be particularly relevant when considering the level *and* the cyclicity of government expenditure. These sources of fiscal illusion are more important when national income is increasing. If politicians are myopic in economic upturns (Downs, 1957) they are likely to indulge pressures to increase government expenditure with little regard for the difficulties they will face when the economy moves into recession. If fiscal illusion increases as national income increases, fiscal illusion increases the likelihood that there will be ‘voracity effects’. How relevant are these sources of fiscal illusion when national income is increasing? How relevant are these sources of fiscal illusion when anticipating that governments will spend procyclically?

If politicians indulge lobby-group pressures to increase public expenditure in an economic upturn, the pressures they face to sustain expenditure in a recession will depend on the extent to which governments are able to borrow. In this paper, predictions (presented in sections two and three of the paper) are tested with reference to the level and the cyclicity of government expenditures in 36 states of the USA between 1980 and 2000 (because subnational governments find it more difficult to

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<sup>2</sup> Dell’Anno and Dollery (2014) employed a Multiple Indicators Multiple Causes model (that relies on the main indicators of fiscal illusion) to consider the relative importance of determinants of fiscal illusion. They discovered “...the chief determinants for the deployment of fiscal illusion strategies are the share of self-employment on total employment, the educational level of citizens, and the size of tax burden” (p. 937). In this paper the approach is quite different. Here the approach is to assess the relative impact of alternative *sources* of fiscal illusion on the level of government spending. It is a new approach to the extent that it includes the full complement of the sources described in this paper.

borrow in a recession).<sup>3</sup> Section four of the paper describes the dataset and the models used to test predictions. The results are presented in section five. Conclusions and policy implications are discussed in the final section of the paper.

## 2. Fiscal Illusion and the *Level of Public Expenditure*.

An established literature has identified the circumstances in which voters are likely to under-estimate the costs of taxation. When testing for fiscal illusion, variables are chosen to proxy the likelihood that there is fiscal illusion. As Oates (1988) explains, the hypothesis is that  $E$  (an estimate of budgetary size) depends on:  $\mathbf{X}$  (a vector of variables that includes income, tax-price, and socio-demographic variables that proxy for tastes and preferences);  $\mathbf{F}$  (a variable that makes it difficult for voters to estimate tax costs) and  $u$  (an error term). If the coefficient  $\beta$  in equation (1) is significant,  $E$  is higher than would be predicted with reference to  $\mathbf{X}$ :

$$E = \alpha\mathbf{X} + \beta\mathbf{F} + u \quad (1)$$

In this literature, the determinants of fiscal illusion are:

(i) *A complex tax system*: Wagner (1976) argued that complexity is the important consideration. In Wagner's study, the vector  $\mathbf{F}$  in equation (1) comprises a single variable,  $S$ . With  $R_i$  equal to the share of revenues generated from each of  $n$  tax categories (e.g. property taxes; general sales taxes; charges and fees),  $S = \sum_{i=1}^n R_i^2$ . The Herfindahl index achieves its maximum value (of unity) when a jurisdiction generates all of its own revenues from a single source. The minimum possible value is when revenues are divided equally across  $n$  different tax categories. Tax systems are not as complex the higher the value of the index. In Wagner's regression,  $S$  was significantly negative (suggesting that expenditure is lower the simpler the tax structure). Wagner could reject the null hypothesis of non-association at a

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<sup>3</sup> Oates (1972) insisted that central government should retain responsibility for macroeconomic stabilization (because central government actions are more productive). Sub-central government spending is less effective. If sub-central governments were to rely on deficit spending they would be forced to compete with one another (e.g. by paying higher interest rates to attract loanable funds). If one local jurisdiction attempted to reduce local unemployment it would have very little success because (with open trade between jurisdictions) the multiplier is very low. Rodden (2002) describes the borrowing constraints that are faced by subnational governments.

0.01 level of significance.

(ii) *Renter illusion*: Renter illusion occurs when local taxes are levied on the owners of property and not on their tenants. In these circumstances, tenants believe that the costs of government expenditure are low (even if taxes are shifted forward in rent charges). It follows that the larger the number of renters in a jurisdiction, the higher the level of government expenditure (other things equal). There is evidence that local jurisdictions tend to spend more per capita on local public services when there is a relatively large fraction of citizens who rent accommodation (see, for example, Bergstrom and Goodman, 1973; Peterson, 1975). Tenants fail to understand the link between levels of local spending and the level of rent that they pay. Once again, the  $\mathbf{F}$ -vector in equation (1) is usually a single variable (the proportion of residents in a jurisdiction who rent accommodation).

(iii) *High Income-elasticities of Tax Revenue*: Oates (1975) introduced the argument that high income-elasticities of tax revenue are likely to increase fiscal illusion. When national income increases, taxes increase the share of income spent in the public sector. Tax awareness is lower when there are forces in the economy that *automatically* increase government revenue (without any formal need to introduce a new tax or to change the tax rate). With a progressive tax rate structure, an increase in national income increases tax revenue and politicians have no reason to bring this to the attention of taxpayers. The empirical literature, focusing only on the impact of high income-elasticities of tax revenue, is mixed. Oates (1975) drew attention to a positive relationship between high income-elasticities of tax revenues and increases in the growth of government expenditure. Craig and Heins' (1980:267) reported a positive relationship between high income-elasticities of tax revenue and high levels of government expenditure. They supported "...the idea that elasticity drives spending". Craig and Heins focused on the impact of estimates of elasticities provided by the *Advisory Commission of Intergovernmental Relations in 1976-77*. They reported a statistically significant positive relationship for 1970 and 1975. Di Lorenzo (1982) and Feenberg and Rosen (1987) did not find a significant relationship between higher income-elasticities of tax revenue and higher levels of public sector spending.

(vi) *Flypaper Effects*. There is a ‘flypaper effect’ if sub-central government expenditure is higher than anticipated when sub-central governments receive lump sum intergovernmental transfers. When money moves in the public sector, money is spent in the public sector (‘money sticks where it hits’). The ‘flypaper effect’ was first identified by Gramlich and Galper (1973), but many other studies have subsequently reported its existence (Hines and Thaler (1995) and Bailey and Connolly (1998) survey this literature). While there are many different explanations for the existence of the ‘flypaper effect’, local voters appear to under-estimate the full costs of public expenditure when a local jurisdiction is in receipt of intergovernmental transfers (Oates, 1979).<sup>4</sup> In this instance the **F**-vector would consist of a single variable that measures local jurisdictions’ reliance on intergovernmental transfers.

(v) *Public Debt Illusion*. If voters ignore future tax liabilities, government borrowing appears to reduce the costs of taxation. Vickrey (1961:133) refers to “... "a public debt illusion" ...(when)... individuals pay no attention to their share in the liability represented by the public debt ...”. Buchanan and Wagner (1977:142) argue that “...events of fiscal history strongly support the hypothesis that unconstrained access to public borrowing will tend to generate excessive public spending”. Once again, there is fiscal illusion if a single variable (as a proxy of government borrowing) is significant (e.g. Kormendi, 1985).

For each hypothesis, the empirical evidence is mixed.<sup>5</sup> Surveys of the literature on fiscal illusion are critical of tests that have been employed. A first concern is that the proxies employed to measure fiscal illusion are far from perfect. When focusing on complexity, and when focusing on income-elasticities of tax revenue, some taxes are simply more transparent than others (irrespective of

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<sup>4</sup> Public choice theory explains the ‘flypaper effect’ with reference to pressure for increased public expenditure. A local jurisdiction’s receipt of intergovernmental grants (paid, in part, by others in the country) provides local politicians with the opportunity to respond to pressures from: local bureaucrats (Niskanen, 1971; Romer and Rosenthal, 1980); local interest groups (Dougan and Kenyon, 1988); and local voters (Oates, 1979). However, at the heart of this analysis is the argument that voters systematically underestimate the tax-cost of expenditure programmes. Voters focus on the average cost of public expenditure, rather than the marginal cost of public expenditure.

<sup>5</sup> Not all studies report evidence of fiscal illusion (e.g. Gemmell et al., 2003), and in some studies there is also evidence that voters underestimate public expenditure (e.g. Cullis and Jones, 1987).



the Herfindahl Index, or the size of the income-elasticity of tax revenue). It has long been argued that taxpayers are likely to know less about *indirect* taxes than they know about *direct* taxes. John Stuart Mill ([1848] 1994) argued: “*If all taxes were direct, taxation would be much more perceived than at present, and there would be a security, which now there is not, for economy in the public expenditure*” (cited in Dell’Anno and Mourão, 2012: 272).<sup>6</sup> In this study, the intention is to distinguish between the impact exerted by high income-elasticities of *direct* tax revenue and the impact exerted by high income-elasticities of *indirect* tax revenue.

A second criticism endemic in this literature is that OLS regressions are not able to deal with the problem of endogeneity. Oates (1988) is critical that it might not be an increase in fiscal illusion (proxied by variables chosen to capture fiscal illusion) that increases government expenditure. Instead, plans to increase government expenditure might explain reliance on variables used to proxy fiscal illusion. For example, governments that anticipate an increased demand for public expenditure might choose to rely on a wider diversity of taxes (a more complex system) to lower the excess burden associated with increased taxation. Also, local jurisdictions (that anticipate that voters will demand greater expenditure as income increases) might choose to rely on tax systems that have high income-elasticities of tax revenue, in order to reduce the transactions costs of continually increasing tax rates in the future. In this paper, the intention is to deal with the problem of endogeneity by instrumenting changes in income and federal aid.

To date, studies have focused on each single source of fiscal illusion.<sup>7</sup> In this paper, it is important to test the relative influence of different causes of fiscal illusion, because (as will be argued in the next section) some determinants are likely to be more important than others when focusing on the cyclicity of public expenditure. Here the objective is to offer a first test of the relative

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<sup>6</sup> Buchanan (1967) argued that a sales tax creates fiscal illusion because it is absorbed in the payments citizens make for private goods and services. Sausgruber and Tyran (2005) argued that indirect taxation is less visible than direct taxation. Pommerehne and Schneider (1978), Dollery and Worthington (1996) and Dell’Anno and Mourão (2012) report evidence that public spending is higher (other things equal) if governments rely on indirect taxation. When Oates (1999:2) considered the optimal tax for sub-central governments, he argued that: “...sales taxes do not get very good marks on a fairness or ability-to-pay criterion. In addition, they do not stack up at all well on the public-choice criterion of providing the electorate with accurate and visible signals of the costs of public programs”. (Oates was aware of the argument that property taxes might create fiscal illusion but he was more concerned with the obfuscation created by sales tax).

<sup>7</sup> Mourão (2008) has compiled a *fiscal illusion index* to capture the influence of more than one source of fiscal illusion, but in this paper the objective is to compare the relative impact of different sources of fiscal illusion.

importance of these determinants of fiscal illusion, controlling for the problem of endogeneity.

### 3. Fiscal illusion and the *Cyclical* of government expenditure.

Pressures to increase public expenditure are more intense when politicians believe that they are able to win votes (by increasing public expenditure) without alarming voters of any increase in taxation.

Downs (1957) argued that politicians focus myopically on electoral payoffs over a four- or five-year electoral interval. If fiscal illusion increases as national income increases, politicians ‘sow the seeds’ of problems they will face in recessions. The more that fiscal illusion increases as national income increases, the greater the likelihood that there will be ‘voracity effects’.

Two sources of fiscal illusion are particularly sensitive to changes in national income: (i) high income-elasticities of sales taxes and (ii) receipts of intergovernmental transfers. When governments rely on high income-elasticities of indirect tax, it is not simply the case that they will not need to introduce a new tax (or a new tax rate), it is also the case they can remain more at ease that the electorate will also not be aware of the increase in tax that they are paying *automatically* as national income increases.

Abbott and Jones (2013) have shown that intergovernmental transfers are often procyclical. They argue that politicians at *federal government* are more likely to increase intergovernmental transfers when national income is increasing. When national income is falling, federal governments are more constrained by falling tax revenues. When national income is falling, politicians at federal government are also more mindful that there are pressures to increase ‘direct’ federal government expenditure on health, education, defence, social security etc. These expenditures are more transparent than intergovernmental transfers. At federal government, politicians are mindful that they will win votes if they persuade voters they are able to manage the economy (e.g. Jones and Hudson, 1996). As they are under pressure to increase ‘direct’ expenditures in an economic downturn, they are less receptive to pressures for intergovernmental transfers in an economic downturn. With this mix of incentives and constraints, political pressures for intergovernmental transfers are more successful in economic upturns than in economic downturns.

In this paper, the argument is that fiscal illusion is likely to increase as income increases, because pressures for governmental transfers are more likely to be successful in economic upturns than in downturns. Mueller (2003) has argued, local politicians are aware that “...*the more the government spends holding taxes constant the happier voters are...*” and “...*the higher the probability of incumbent politicians being re-elected*” (p.223). With high income-elasticities of sales tax revenues and with heavy reliance on intergovernmental transfers, politicians in sub-central governments are more likely to act indulgently when national income is increasing.

Other things equal:

- (i) *high income-elasticities of indirect tax revenue and reliance on intergovernmental transfers increase the level of sub-central government expenditures;*
- (ii) *high income-elasticities of indirect tax revenue increase the likelihood of procyclical government expenditure;*
- (iii) *reliance on intergovernmental transfers increases the likelihood of procyclical government expenditure.*

#### **4. Fiscal Illusion and Sub-Central Government Expenditures in the USA.**

To test the extent to which fiscal illusion impacts on the level of government spending, we can adapt the model of Craig and Heins (1980) as follows:

$$G_i = \beta_0 + \beta_1 Y_i + \beta_2 F_i + \beta_3 A_i + \beta_4 C_i + \beta_5 S_i + \beta_6 B_i + \beta_7 D_i + \beta_8 GI_i + \beta_9 ID_i + \beta_{10} NW_i + \beta_{11} SE_i + \beta_{12} PIE_i + \beta_{13} RHF_i + \beta_{14} OWN_i + \epsilon_t \quad (2)$$

where:

G is state current government spending per capita;

Y is state personal income per capita;

F is federal aid per capita;

A is the percentage of population aged over 65 years;

C is the percentage of the population that lives in an urban area;

S is the proportion of revenues originating at the state level;

B is state borrowing as a proportion of GDP;

D is total state debt outstanding as a proportion of GDP;

GI is the Gini index of income inequality;

ID is a measure of state government ideology;

NW is the proportion of the population that is non-white;

SE is the income elasticity of state sales tax revenue;

PIE is the income elasticity of state personal income tax revenue;

RHF is a Herfindahl index of state revenue proportions;

OWN is the rate of owner occupation

This model differs from the original Craig and Heins (1980) specification in a number of respects. Firstly, A covers the population aged 65 years and over, rather than the population aged 18 and over, because this is now a more significant driver of state spending. Secondly, population density is no longer included because it has a strong association with the proportion of the state population that lives in an urban area. Thirdly, we add a number of control variables not previously considered, which could be important in influencing the level of government spending, such as state ideology (measured between 0 for ‘conservative’ and 100 for ‘liberal’) and the proportion of non-white population (e.g. Facchini, 2014). Fourthly, fiscal illusion is measured through six alternative approaches: the rate of owner occupation (OWN), which inversely picks up the proportion of renters; the Herfindahl index of state revenue proportions (RHF); the percentage of revenue originating locally (S); the amount of state borrowing (B) and the total stock of debt (D); the income-elasticities of sales tax (SE) and personal income taxation (PIE). We rely on more recent estimates of tax elasticities in Bruce et al. (2006), rather than the estimates available in the *Advisory Commission of Intergovernmental Relations* used by Craig and Heins (1980). Through including six proxies for fiscal illusion we hope to establish

whether a consistent pattern of fiscal illusion emerges, or whether one proxy emerges as being particularly significant for determining government spending. Except for the coefficients for RHF and for OWN, the expectation is that all of the estimated coefficients will be positive.

Government spending per capita, the proportion of revenue originating at state level, borrowing for each state and the total stock of outstanding debt are available in the *Annual Survey of State Government Finances*. We also use the same source to calculate the Herfindahl index of revenue sources. The population data for C, A and NW are taken from the *US Census Bureau* along with the Gini coefficient data for income inequality and the rate of owner occupation. The personal income per capita series is derived from the *Bureau of Economic Analysis*. Our measure of political ideology is the NOMINATE measure of state government ideology (Berry et al., 2010). Federal aid per capita data is available from the *US Office of Management Budget*. The estimates of income elasticities are provided by Bruce et al. (2006) for Personal Income Taxes and for Sales Taxes (based on tax base data between 1967 and 2000). They produced estimates for 48 states but this paper focuses on the 36 states for which both elasticities are reported (to analyse a consistent sample of states).<sup>8</sup> The model is a cross-section regression, estimated separately for three years: 1980, 1990 and 2000, in order to test the robustness of the model over time. Given the potential for problems of endogeneity we use a three-stage least squares (3SLS) estimator that controls for potential endogeneity in personal income per capita and federal aid per capita. We instrument state personal income per capita using personal income of the US regional division that the US state belongs too. There are nine regional divisions used by the *US Census Bureau*: New England; Mid-Atlantic; East North Central; West North Central; South Atlantic; East South Central; West South Central; Mountain; Pacific. By using the regional personal income per capita, we control for the impact of economic shocks arising from neighbouring states. The instruments for federal aid per capita are urban population; population density; and political party coincidence between the state governor and the US president.

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<sup>8</sup> The states are Alabama, Arizona, Arkansas, California, Colorado, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Utah, Virginia, Vermont, West Virginia, Wyoming.

To test the second set of hypotheses, the cyclicalities of government spending can be estimated as follows (see for example Arena and Revilla (2009) and Lane (2003)) for similar models:

$$\Delta g_{it} = \alpha_i + \phi_1 \Delta g_{it-1} + \phi_2 \Delta g_{it-2} + \beta_1 \Delta y_{it} + \beta_2 \Delta y_{it-1} + \mu_1 \Delta br_{it} + \mu_2 \Delta br_{it-1} + \sum_{t=2}^T \lambda_t D_t + \varepsilon_{it} \quad (3)$$

where  $g_{it}$  is the log of government spending per capita for the  $i^{\text{th}}$  state at period  $t$ ,  $y$  is the log of state gross domestic product per capita, while  $br$  denotes state government borrowing per capita. We add time dummies  $D_t$  to account for idiosyncratic time shocks, while  $\varepsilon_{it}$  is a white noise error. The dynamic specification of our model allows for potential persistence in  $g_{it}$ , through the inclusion of the lagged dependent variables, and for the possibility that government spending might react with a lag in response to shocks in GDP or government borrowing. These lagged responses could be due to administrative delays or lags caused by delays in the budgetary process. The cyclicalities of government spending is picked up through the  $\beta_1$  and  $\beta_2$  coefficients, with  $\beta_1 < 0$  for example indicating government spending is counter-cyclical and  $\beta_1 > 0$  suggesting procyclical behaviour. The growth in state borrowing could also be expected to positively influence the growth in government spending, so  $\mu_1$  and  $\mu_2$  are expected to be positive. This dynamic panel data model can be estimated through the SYS-GMM estimator of Blundell and Bond (1998). The use of SYS-GMM estimator may be limited in this application, since it is expected that the number of time periods are relatively few and the number of individual units relatively large. We use data from 1980 to 2000 for these estimations.

We are also interested in the extent to which the procyclicality varies with the income elasticity of tax revenues and the reliance of states on federal government transfers. Investigating the effect of the tax elasticity, equation (3) is amended as follows:

$$\begin{aligned} \Delta g_{it} = & \alpha_i + \phi_1 \Delta g_{it-1} + \phi_2 \Delta g_{it-2} + \beta_1 \Delta y_{it} + \beta_2 \Delta y_{it-1} + \mu_1 \Delta br_{it} + \mu_2 \Delta br_{it-1} \\ & + \delta_1 (\Delta y_{it} \times E_i) + \delta_2 (\Delta y_{it-1} \times E_i) + \sum_{t=2}^T \lambda_t D_t + \varepsilon_{it} \end{aligned} \quad (4)$$

Where  $E_i$  denotes the income elasticity of sales tax revenue or personal income tax revenue.

Statistically significant interaction term  $(\Delta y_{it} \times E_i)$  or  $(\Delta y_{it-1} \times E_i)$  and positively signed

coefficients are consistent with the hypothesis that procyclical spending reacts positively to a higher income elasticity of tax revenues.

To account for the influence of transfers on the cyclicality of spending, we interact the growth in federal transfers ( $\Delta tr_{it}$ ) with the growth in state GDP ( $\Delta y_{it}$ ), so that (3) becomes:

$$\begin{aligned} \Delta g_{it} = & \alpha_i + \phi_1 \Delta g_{it-1} + \phi_2 \Delta g_{it-2} + \beta_1 \Delta y_{it} + \beta_2 \Delta y_{it-1} + \mu_1 \Delta br_{it} + \mu_2 \Delta br_{it-1} \\ & + \varphi_1 (\Delta y_{it} \times \Delta tr_{it}) + \varphi_2 (\Delta y_{it-1} \times \Delta tr_{it-1}) + \sum_{t=2}^T \lambda_t D_t + \varepsilon_{it} \end{aligned} \quad (5)$$

The predictions are that  $\varphi_1$  and  $\varphi_2$  will be positively signed and the interaction terms will be statistically significant.

## 5. Estimation Results.

The estimation results from equation (1) are presented in table 1 (for 36 states in 1980, 1990 and 2000). We find the following:

- (i) *Levels of government expenditure and fiscal illusion.* Among the six chosen measures of fiscal illusion, income elasticity of sales tax revenue has statistical significance. The SE variable is statistically significant for the 2000 period and the estimated coefficient is positively signed as expected. The fact that the sales tax income elasticity is statistically significant but the personal income tax elasticity is not, is important when reflecting on the unresolved debate in the literature as to whether or not high income-elasticities of tax revenue increase levels of government spending. The results indicate a growing trend in fiscal illusion and suggest that the debate is sensitive to differences in the mix of income and sales tax revenues in different tax bases. The impact of fiscal illusion is likely to be more obvious the more sub-central governments rely on indirect tax revenues.

< TABLE 1 NEAR HERE >

- (ii) *Levels of public expenditure and intergovernmental transfers.* In table 1, the federal aid per capita series is the most statistically significant control variable and it is signed positively

throughout. Own revenues are statistically significant for the 1990 period but the estimated coefficient does not have the expected sign.

(iii) *Borrowing and the level of public spending.* The role of government borrowing across the US states is found to have a statistically significant effect on the level of government spending for the 1990 period only. In this case, the estimated coefficient has the expected positive sign. In contrast, the total stock of outstanding debt is not statistically significant.

(iv) *The cyclicalities of public expenditure and high income-elasticities of indirect tax revenue.*

Turning to the estimation of the cyclicalities of state spending, the estimated cyclicalities coefficients are reported in table 2. We find that  $\Delta y_{it}$  is statistically significant and the positively-signed coefficient of 0.106 implies a procyclical pattern of spending, albeit with a lag. In contrast, the growth in borrowing does not affect the growth in spending.

<TABLE 2 NEAR HERE >

Whether the income elasticity of sales tax revenue positively influences the procyclical nature of public spending can be captured by the interaction terms detailed in (4). The results presented in the second and third columns of table (2) show that  $(\Delta y_{it-1} \times E_i)$  is statistically significant and the estimated coefficient positively signed as expected. The lagged procyclical public spending grows when the illusory impact of taxation is stronger for high incomes. The interaction terms are not statistically significant when using the personal income tax elasticity.

(v) *The cyclicalities of public expenditure and intergovernmental transfers.* The results in the final column are also consistent with the hypothesis that procyclicality increases with the growth in intergovernmental transfers. The estimated coefficient  $\phi$  is positively signed and the interaction  $(\Delta y_{it-1} \times \Delta tr_{it-1})$  is statistically significant. The value of the coefficient is greater than one and this is consistent with the hypothesis that the ‘flypaper effect’ can be explained with reference



to fiscal illusion. Once again, fiscal illusion increases the procyclicality of government expenditures over and above the inherent procyclicality in these sources of governmental revenue.

< TABLE 4 NEAR HERE >

## 6. Conclusions

In the literature that explains the existence of procyclical expenditure, attention has focused on the importance of ‘voracity effects’ (Lane and Tornell, 1996; Tornell and Lane, 1999). In this paper attention has focused on the proposition that fiscal illusion increases the likelihood of ‘voracity effects’. With ‘voracity effects’, political pressures to increase public expenditure are more intense as national income increases. In this paper, it has been argued that the ‘intensity’ of political pressures depends on the way they are received (as well as on the way that they are exerted). Vote-maximising politicians are more inclined to increase public expenditures when they believe they are able to increase expenditures, without alarming voters that there is an increase in taxation.

There are two sources of fiscal illusion that increase the likelihood of ‘voracity effects’. With high income-elasticities of sales tax revenue and dependence on intergovernmental transfers, voters are more likely to underestimate the costs of taxation as national income increases. The first testable prediction in this paper is that high income-elasticities of sales tax revenue and dependence on intergovernmental transfers increase the *level* of fiscal public expenditure (other things equal).

The analysis of government spending in 36 US states between 1980 and 2000 produced results that are consistent with the proposition that high income-elasticities of sales tax revenue and receipt of intergovernmental transfers are important determinants of fiscal illusion. This is the first test (to our knowledge) of the *relative* importance of the full complement of potential sources of fiscal illusion (as described in this paper). It is also a test that has been designed to address the problem of endogeneity. The results are consistent with the proposition that high income-elasticities of sales tax revenue and receipt of intergovernmental transfers are important determinants of fiscal illusion.

When reporting that some potential sources of fiscal illusion are not significant, the results in this paper are consistent with results reported by other studies of fiscal illusion.<sup>9</sup> The results also shed insight into the existence of the unresolved debate about the relevance of high income-elasticities of tax revenue. Differences in empirical results that refer to the significance of high income-elasticities of tax revenue are likely to depend on the extent to which taxation is raised by direct taxation and by indirect taxation. The results in this paper indicate that voters are more inclined to underestimate the costs of taxation when taxation is raised by indirect taxation.

The results that *both* high income-elasticities of sales tax revenues and intergovernmental transfers are relevant sources of fiscal illusion is important because, in this paper, the second testable proposition is that fiscal illusion also increases the cyclicity of government expenditure. Having addressed the issue of endogeneity, the results are consistent with the proposition that the level of public expenditure is higher than anticipated (other things equal) because voters under-estimate the costs of taxation.

Turning to the second set of empirical tests reported in this paper, the proposition is that fiscal illusion will increase the level *and* the cyclicity of government expenditure. The first important observation (in table 3) is that the coefficient on the interaction term  $(\Delta y_{it-1} \times E_i)$  is significant and substantially larger than the coefficient on  $\Delta y_{it-1}$ . The presence of high income-elasticities of sales tax revenue is important (other things equal) when explaining the likelihood that sub-central governments will spend procyclically. The second important observation (in table 4) is that the coefficient on  $(\Delta y_{it-1} \times \Delta tr_{it-1})$  is significant (and higher than the insignificant coefficient on the volatility of income). As in other studies (e.g. Abbott and Jones, 2013), sub-central governments are more likely to spend procyclically the more they rely on intergovernmental transfers. For both income elasticities of sales tax revenues and intergovernmental transfers, the relative sizes of coefficients are consistent with the hypothesis that fiscal illusion increases the procyclicality of

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<sup>9</sup> The results in this paper are consistent with results in other studies that question the relevance of other sources of fiscal illusion, e.g. Blom-Hansen's (2005) assessment of the relevance of renter illusion in the Netherlands.

government expenditure over and above the inherent procyclicality in these sources of government revenue.

In this paper, the first set of results (correcting for endogeneity) indicate that fiscal illusion increases the level of government spending. The second set of results indicate that the same determinants of fiscal illusion (high income-elasticities of sales tax revenue and dependence on intergovernmental transfers) and their impact on fiscal illusion are also relevant when explaining the cyclicity of government expenditure.

The tests in this paper are consistent with the proposition that myopic, vote-maximising politicians increase the likelihood of procyclical government expenditure by indulging pressures to increase governments expenditures in economic upturns (and by depleting the budgetary reserves that might otherwise have been employed to mitigate economic recession). While there are circumstances in which procyclical spending might maximise a community's welfare, commentators are dismissive because the circumstance are very restrictive (Halland and Bleaney, 2009).<sup>10</sup> As fiscal illusion is relevant when explaining the existence of government failure, the costs of fiscal illusion exceed the static misallocation costs that are associated with 'excessive' levels of public expenditure (e.g. Mueller, 2003; Cullis and Jones, 2009). Fiscal illusion also imposes costs because there is additional uncertainty if fiscal illusion creates 'excessive' cyclicity. Low-income individuals are vulnerable in economic recessions (e.g. Bordo and Meissner, 2011) and governments are not able to offer the levels of social protection that the vulnerable rely on in recessions.<sup>11</sup>

With evidence that the sources of fiscal illusion that increase the likelihood of 'voracity effects' are important determinants of the *level* of public expenditure, fiscal illusion is also relevant when analysing the *cyclicity* of government expenditure.

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<sup>10</sup> Lane (2003) argues that there are circumstances in which procyclical government spending might maximise welfare if private and public consumption are complements. Alesina et al. (2008) argue that procyclical spending *might* increase welfare in developing countries because of the failures they experience in capital markets.

<sup>11</sup> While this paper has focused on sub-central governments, fiscal illusion is also likely to be relevant when explaining the difficulties that federal governments experience when they must take action to mitigate the costs of recessions (Abbott and Jones, 2012). R.F. Harrod (Keynes' biographer) stated that Keynes believed economic policy would be made by "...a small group of enlightened men...in accordance with the 'public interest'" (cited by Buchanan and Wagner 1977: 84), but here the evidence is consistent with the argument that politicians' own political ambitions may also be relevant when explaining the cyclicity of government expenditure.

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**Table 1: 3SLS regressions of the determinants of per capita current government spending**

	2000	1990	1980
constant	2503.77 (0.48)	6918.12 (1.62)	307.81 (0.38)
State GDP per capita (Y)	-0.147 (-1.37)	-0.128 (-1.03)	0.102 (1.86)
Federal aid per capita (F)	0.732* (2.09)	3.534* (2.58)	2.199* (4.02)
Population over 65 (A)	83.484 (1.10)	-20.695 (-0.61)	3.362 (0.33)
Urban population (C)	46.157 (1.30)	6.848 (0.59)	2.727 (0.63)
Own revenue (S)	-2070.55 (-1.39)	4382.91* (2.21)	1070.10 (1.86)
State borrowing (B)	-2.072 (-0.42)	8.791* (2.07)	-0.535 (-0.36)
State Debt (D)	0.778 (1.14)	-0.404 (-0.82)	0.151 (0.96)
Gini coefficient (GI)	-4472.64 (-0.61)	-14593.7 (-1.67)	-2701.68 (-1.34)
Government ideology (ID)	11.890 (1.30)	-1.781 (-0.29)	3.203* (2.31)
Non-white population (NW)	11.739 (0.89)	7.652 (0.97)	3.653 (1.78)
Sale tax elasticity (SE)	922.75* (2.07)	269.77 (0.94)	-130.16 (-0.86)
Income tax elasticity PIE	-148.64 (-0.99)	20.598 (0.18)	29.437 (0.89)
Herfindahl index revenues (RHF)	7205.19 (1.49)	-1941.44 (-0.48)	-1356.18 (-1.40)
Owner occupation (OWN)	-1458.61 (-0.25)	2611.21 (0.99)	-1455.33 (-1.65)
R <sup>2</sup>	0.125	0.264	0.605

notes: Estimates produced using 3SLS estimation, controlling of for the endogeneity of personal income and federal aid. The instrumented equations are not reported. T-ratios are reported in parentheses calculated from robust standard errors and \* indicates significance at the 5% level.



**Table 2: Cyclical equations**

		Adding $(\Delta y_{it} \times E_i)$ and $(\Delta y_{it-1} \times E_i)$		Adding
		Sales Tax Elasticity	Personal Income Tax Elasticity	$(\Delta y_{it} \times \Delta tr_{it})$ and $(\Delta y_{it-1} \times \Delta tr_{it})$
constant	0.087*	0.098*	0.102*	0.084*
	(4.36)	(5.01)	(5.99)	(3.60)
$\Delta g_{it-1}$	-0.151	-0.141	-0.184	-0.197*
	(-1.74)	(-1.44)	(-1.94)	(-2.41)
$\Delta g_{it-2}$	-0.051	0.091	-0.150	-0.134
	(-0.60)	(-1.18)	(-1.86)	(-1.50)
$\Delta y_{it}$	0.107	-0.288*	0.094	-0.121
	(1.17)	(-2.24)	(1.03)	(-0.62)
$\Delta y_{it-1}$	0.106*	0.125*	0.137*	0.179*
	(3.29)	(2.42)	(2.69)	(4.41)
$(\Delta y_{it} \times E_i)$	-	0.011	0.039	-
		(0.16)	(1.62)	
$(\Delta y_{it-1} \times E_i)$	-	0.343*	-0.076	-
		(1.98)	(-1.67)	
$(\Delta y_{it} \times \Delta tr_{it})$	-	-	-	0.676
				(1.17)
$(\Delta y_{it-1} \times \Delta tr_{it-1})$	-	-	-	3.23*
				(2.89)
$\Delta br_{it}$	-0.0004	-0.0015	0.00002	-0.012
	(-0.21)	(-0.65)	(0.01)	(-1.12)
$\Delta br_{it-1}$	0.002	0.002	0.003	-0.003
	(1.35)	(1.19)	(1.73)	(-0.37)
N×T	1059	894	849	810
No. of instruments	69	72	72	72
SC(1)	-5.49*	-5.30*	-5.10*	-4.66*
SC(2)	0.34	1.13	1.53	0.27
SC(4)	0.60	0.27	0.29	1.53
Hansen test of over id. rest $\chi^2(43)$	26.01	17.37	16.88	15.85

Notes: Estimates of the cyclical equation derived using the SYS-GMM dynamic panel data estimator of Blundell and Bond (1998) (estimates of the time dummy coefficients are also generated but not reported to conserve space). The number of instruments displayed refers to the number of lagged values of the regressors (in level and first difference form) that are used as instruments for the explanatory variables. SC denotes the tests for serial correlation at 1<sup>st</sup>, 2<sup>nd</sup> and 4<sup>th</sup> order. The autocorrelation tests are for zero autocorrelation in first-differenced errors. The Hansen test of over-identifying restrictions is reported, which is robust to heteroskedasticity and autocorrelation. \* indicates significance at the 5% level (t-ratios from robust standard errors are shown in parentheses).